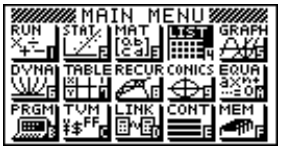
CHAPTER 1 Calculator Notes for the CFX-9850GB Plus

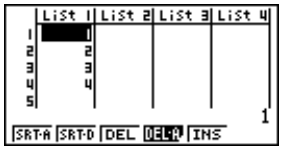
Note 1A • Entering Lists

The calculator contains six folders, each with six preset lists. You can enter 255 elements into a list if enough memory is available. You can enter data directly into lists from either LIST or STAT mode.

Clearing Data

From the Main Menu, select LIST or STAT and press [EXE]. If a list already has data in it, position the cursor so that any cell of the list is highlighted, then press [F4] (DEL-A). Press [F1] (YES) to delete all the cells in the list.





Entering Data Directly into a List

Follow the steps below to enter data, for example, {400, 455, 390, 450, 360, 320, 480, 480}, into a list.

a. Select LIST or STAT from the Main Menu.

b. Enter each number into List 1. After entering each data value, press [EXE]. If you wish to add a data value in the middle of the list, move the cursor to the place of insertion, press [F5] (INS), then enter the new number and press [EXE]. To remove an entry from a list, highlight the entry and press [F3] (DEL).

Entering Data into a List from the Run Screen

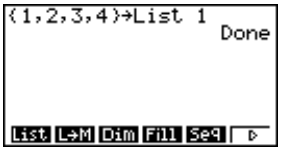
If you are working with a short list, you may want to enter it while in the Run screen. To enter the data {1, 2, 3, 4} into List 1, follow the steps below.

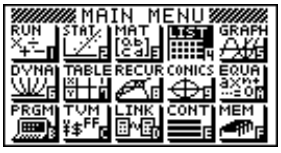
a. Press [OPTN] [F1] (LIST) to list the data.

b. Press [SHIFT] [{] [1] [,] [2] [,] [3] [,] [4] [SHIFT] [}]. (The brace symbols are above the multiplication and division signs.)

c. Press [→] [F1] (List) [1] [EXE].

d. You can check to see that the new data is in the list by selecting LIST or STAT from the Main Menu.





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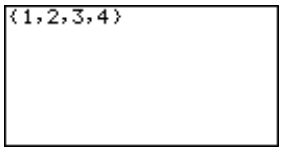
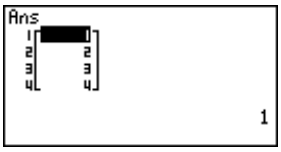
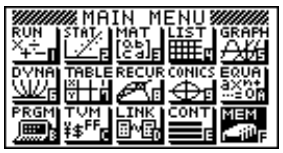
You can also enter a list into the Run screen without storing it in a stat list by entering the values as in **step b** on page 8. Press EXE.

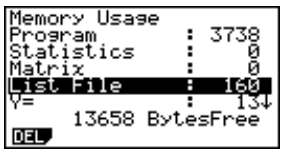




Deleting a List

To delete a single list while in LIST mode, highlight any entry in the list and press F4 (DEL-A) F1 (Yes). In STAT mode, press F6 (▷), then F4 (DEL-A) F1 (Yes). To delete all lists, select MEM from the Main Menu. Highlight Memory Usage and press EXE. Arrow down to highlight List File and press F1 (DEL) F1 (FILE1) F1 (Yes).





Switching Between List Files

You can store up to six lists (List 1 through List 6) in each file (File 1 through File 6). To switch between list files, select LIST from the Main Menu and press EXE. Press SHIFT [SET UP] to display the List setup screen. Press the appropriate function key to select the file you want.

Note 1B • Mean, Median, and Mode

Enter the data into a list. (See **Note 1A** if you don't remember how to enter data into a list. This example uses the same data as the first list entered in **Note 1A.**)

a. Press MENU, select RUN, and press EXE.

b. Press OPTN F1 (LIST).

c. Press F6 to see more menu options.

d. To find the mean, press F3 (Mean) F6 F6 F1 (List), and the number of the list that contains the data. Then close the parentheses, press EXE, and press F6 to see more menu options.

e. To find the median, press F4 (Med) F6 F6 F1 (List), the number of the list that contains the data, and EXE.

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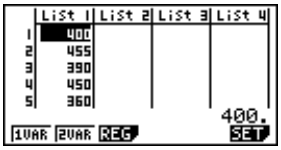
You can also calculate all the statistical values of a data set at once, including the median, mean, mode, and summary values.

a. Press MENU. Highlight STAT and press EXE. Highlight any cell in your list.

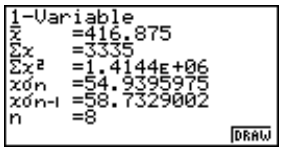
b. Press F2 (CALC).

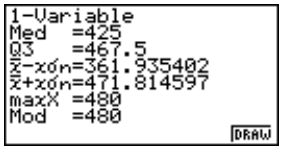
c. Press F1 (1VAR) to access the statistical values.



Use the down arrow to display the entire list of values.

$\bar{x} = 416.875$	the mean
$\Sigma x = 3335$	the sum of the x-values
$\Sigma x^2 = 1.414425$	the sum of the squares of the x-values
$x\sigma n = 54.93959751$	the population standard deviation
$x\sigma n{-}1 = 58.73290025$	the sample standard deviation
$n = 8$	the number of data values
minX = 320	the minimum of the list
Q1 = 375	the first quartile
Med = 425	the median
Q3 = 467.5	the third quartile
$\bar{x}{-}x\sigma n$	data mean − population standard deviation
$\bar{x}{+}x\sigma n$	data mean + population standard deviation
maxX = 480	the maximum of the list
Mod	the mode of the list





Note 1C • Box Plots

Entering the Data

Enter the data set into a list. In this example, List 1 is {400, 455, 390, 450, 360, 320, 480, 480}. (See **Note 1A** if you need help entering data.)

Setting the VIEW WINDOW Values

Select STAT from the Main Menu. While the statistical data list is on the display, press SHIFT [SET UP] F2 (Man) EXIT.

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Press SHIFT [V-Window] and input the following values on the View Window screen. Press EXE after each entry.

Xmin: 300 (This value is a number slightly less than the minimum of the data.)

max: 500 (This value is a number slightly greater than the maximum of the data.)

scale: 1 (This number does not affect a box plot.)

Ymin: 0

max: 10 (This number is not important for a box plot. Any number greater than **Ymin** will work.)

Press EXIT or EXE when you are done entering values. The view window shown is [300, 500, 1, 0, 10, 0].

Displaying the Box Plot

This example uses the data in **List 1**, but you can choose any list.

a. Press MENU to display the Main Menu. Highlight **STAT** and press EXE.

b. Press SHIFT [**SET UP**]. Arrow down to **Grid** and press F2 (**Off**). Press EXE.

c. Press F1 (**GRPH**) to display the graph menu.

d. Press F6 (**SET**) to enter the graph settings menu. Press a function key to select a graph.

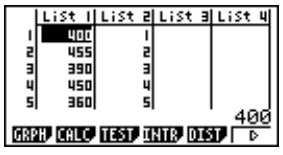
e. Arrow down to **Graph Type**. Press F6 (▷). Press F2 (**Box**) to select **MedBox**. (Pressing F3 (**Box**) also gives a box plot; but it is a MeanBox, which is not used in this course.)

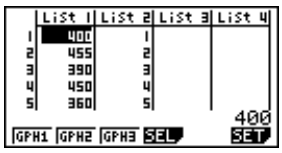
f. Arrow down to **XList** to display list choices. Press F1 to select **List 1**.

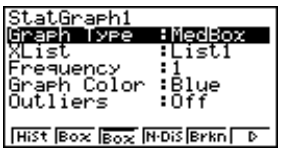
g. Arrow down to **Graph Color**. Press a function key to select the graph color.

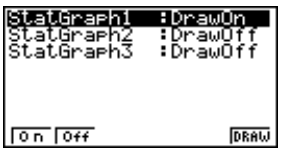
h. Arrow down to **Outliers** and select **On** or **Off** by pressing the corresponding function key.

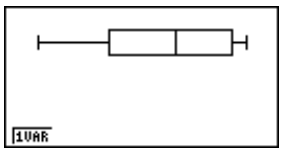
i. Press EXIT to return to the Graph screen. Press F4 (**SEL**). Use the down arrow and F1 or F2 to turn on the graph you selected and to turn off the other graphs. Press F6 (**DRAW**) to draw the graph. (You can also graph from the Graph screen by pressing the function key corresponding to the number of the graph that you want to display.)











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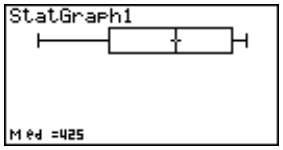
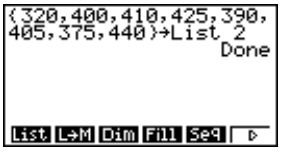
Tracing on a Box Plot

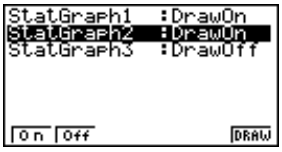
Press SHIFT [Trace]. The trace option allows you to see the five summary values for the box plot by pressing the left and right arrow keys. When you press the up and down arrow keys, you move from one box plot to another. (See the **Graphing More Than One Box Plot** section that follows.) Look in the upper-left corner of the calculator screen to see which plot the calculator is tracing.

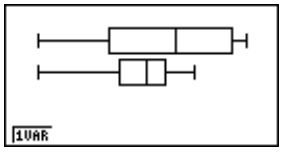


Graphing More Than One Box Plot

The calculator can graph up to three box plots at once. Follow the directions for making a box plot and press F4 (SEL). Use the arrow keys and F1 or F2 to choose DrawOn or DrawOff for each graph. Be sure the list you select when setting up each box plot is the same list in which you've entered the data. Using a different color for each plot is an effective way to display them.







Errors

If you don't see a graph and you have selected **Stat Wind:Manual**, check **Xmin** and **Xmax** to make sure that your data lies between those values. If the minimum value is greater than the maximum value, the axis will be inverted. If you get a **Dim ERROR**, you have selected a blank list. If anything appears on the graph other than the statistical graph you set, press SHIFT [**Sketch**] F1 (**Cls**).

Note 1D • Histograms

Entering the Data

Enter the data into a list. In this example, **List 1** is {400, 455, 390, 450, 360, 320, 480, 480}. (See **Note 1A** if you need help entering the data.)

Setting the VIEW WINDOW Values

Select STAT from the Main Menu. While the data list is displayed, press SHIFT [SET UP] F2 (**Man**) EXIT.

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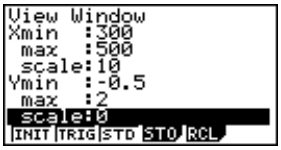
Press [SHIFT] [V-Window] and input the following values into the View Window screen.



Xmin: 300 (This value is a number slightly less than the minimum of the data.)

max: 500 (This value is a number slightly greater than the maximum of the data.)

scale: 10 (This number sets the distance between the tick marks on the horizontal axis. This number is not critical, but if it's too small, the tick marks will make the horizontal axis appear too thick.)

Ymin: −0.5 (Using a negative value allows you to see the horizontal axis. This value should be about a quarter of a fifth of the Ymax value, but the opposite sign.)

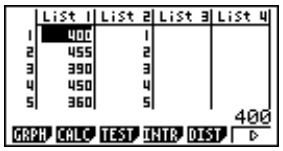
max: 2 (This value should be the height of the tallest bar. You might have to revise this value when you look at the graph. Tracing on the graph can help you determine the maximum bar height.)

scale: 0 (This value does not affect a histogram.)

Press [EXIT] or [EXE] when you are done entering values. The view window shown is [300, 500, 10, −0.5, 2, 0].

Displaying the Histogram

This example assumes the data is in **List 1**, but you can choose any list.

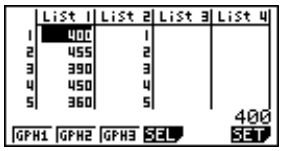


a. Press [MENU] to see the Main Menu. Highlight **STAT** and press [EXE].

b. Press [SHIFT] [SET UP]. Arrow down to **Grid** and press [F2] (**Off**). Press [EXE].

c. Press [F1] (GRPH) to display the graph menu.

d. Press [F6] (SET) to enter the graph settings menu. Press a function key to select a graph.



e. Arrow down to **Graph Type**. Press [F6] (▷) to display the 1-variable graph types. Press [F1] (**Hist**) to select **Hist**.

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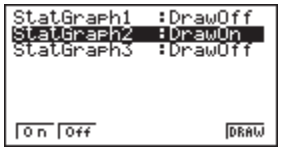
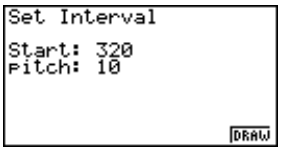
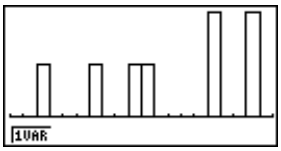
f. Arrow down to **XList** to display list choices. Press F1 to select **List 1**.

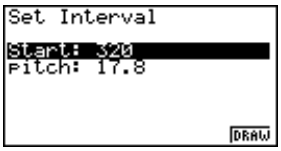
g. Arrow down to **Graph Color**. Press a function key to select the graph color.

h. Press EXIT to return to the Graph menu. Press F4 (SEL). Use the down arrow and F1 or F2 to turn on the graph you selected and to turn off the other graphs. Press F6 (DRAW). (You can also graph from the Graph screen by pressing the function key corresponding to the number of the graph that you want to display.) The Set Interval menu will appear with the values of **Start** and **Pitch** automatically set. You may change both values. **Start** is the minimum *x*-value shown on the graph, and **Pitch** changes the width of the bars on the graph. A smaller pitch value results in narrower bars. Press EXE to accept the new values (if any) and F6 (DRAW) to draw the graph.



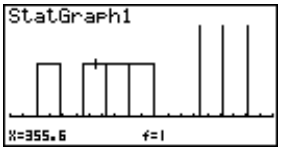






Tracing on a Histogram

Press SHIFT [Trace]. Use the left and right arrow keys to move the cursor.



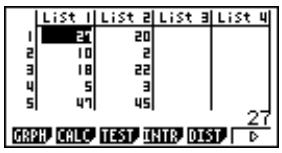
Errors

You will get a **Ma ERROR** message if you attempt to make a histogram with too many intervals (bars). Increase the pitch to correct this error. If anything appears on the screen other than the statistical graph you set, press SHIFT [Sketch] F1 (Cls).

Note 1E • Scatter Plots

Entering the Data

Enter the *x*-coordinates (horizontal axis) into one list and the *y*-coordinates (vertical axis) into another list. **List 1** and **List 2** are used for this example. (See **Note 1A** if you need help entering the data.) Note: The data can also be entered while in the Stat screen. Any changes made to lists while in **STAT** mode show up in the same lists in **LIST** mode and vice versa. In this example, {27, 10, 18, 5, 47, 36, 8} is entered into **List 1** and {20, 2, 22, 3, 45, 28, 15} is entered into **List 2**.



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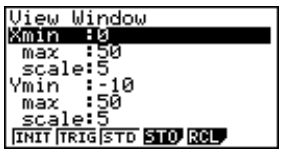
Setting the VIEW WINDOW Values

Select STAT from the Main Menu. While the data list is on display, press SHIFT [SET UP] F2 (**Man**) EXIT.

Press SHIFT [**V-Window**] and input the following values on the view window screen.



Xmin: 0 (This value is a number slightly less than the minimum of the *x*-coordinates.)

max: 50 (This value is a number slightly more than the maximum of the *x*-coordinates.)

scale: 5 (This number is the distance between tick marks. You can use 0, that is, no tick marks, or a value usually less than or equal to $\frac{\text{Xmax} - \text{Xmin}}{10}$. If your scale value is too small, the *x*-axis will disappear.)

Ymin: −10 (This number is slightly less than the minimum of the *y*-coordinates. In this example, 0 would work, but a negative number allows you to see the *x*-axis.)

max: 50 (This number is slightly more than the maximum of the *y*-coordinates.)

scale: 5 (This number is the distance between tick marks. You can use 0, that is, no tick marks, or a value usually less than or equal to $\frac{\text{Ymax} - \text{Ymin}}{10}$. If your scale value is too small, the *y*-axis will appear too thick.)

The view window shown is [0, 50, 5, −10, 50, 5].

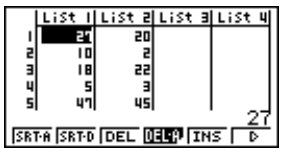
Displaying the Scatter Plot

a. Press MENU to see the Main Menu. Highlight STAT and press EXE.

b. Press SHIFT [SET UP]. Arrow down to **Grid** and press F2 (**Off**). Press EXE.

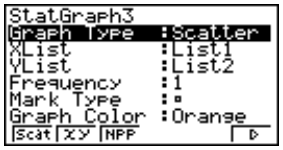
c. Press F1 (**GRPH**) to display the graph menu.

d. Press F6 (**SET**) to enter the graph settings menu. Press a function key to select a graph.



e. Arrow down to **Graph Type**. Press F1 (**Scat**) to select **Scatter**.

f. Arrow down to **XList** to display list choices. Press F1 to select **List 1**. Similarly, choose **List 2** for **YList**.

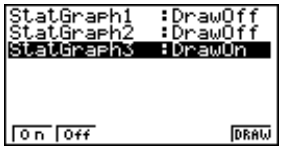


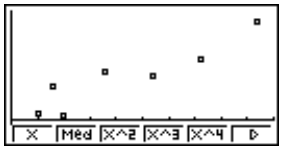
g. Arrow down to **Mark Type** and select a mark.

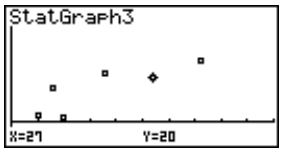
h. Arrow down to **Graph Color**. Press a function key to select a graph color.

(continued)

i. Press [EXIT] to return to the Graph screen. Press [F4] (SEL). Use the down arrow and [F1] or [F2] to turn on the graph you selected and to turn off the other graphs. Press [F6] (DRAW) to draw the graph. (You can also graph from the Graph screen by pressing the function key corresponding to the number of the graph that you want to display.)







Tracing on a Scatter Plot

Press [SHIFT] [Trace]. Use the left and right arrow keys to move the cursor.

Graphing More Than One Scatter Plot at a Time

The calculator can graph up to three scatter plots at the same time. Follow the directions for making a scatter plot and press [F4] (SEL). Use the arrow keys and [F1] or [F2] to choose DrawOn or DrawOff for each graph. Be sure the list you select when setting up each scatter plot is the same list in which you've entered the data. Choose a different mark and color for each plot.

Errors

A Dim ERROR message means that the two lists do not have the same number of entries. The same error message could appear if you accidentally turned on a graph you are not using or if you named the wrong list. To clear extra graphs from the screen, press [SHIFT] [Sketch] [F1] (Cls).

Note 1F • POINTS Program

Link or manually enter the POINTS program into your calculator. (See **Note 0F** or **Note 0G.**) The POINTS program plots a single point in a graphing window that measures from −5.5 to 5.5 on the horizontal axis and from −3.5 to 3.5 on the vertical axis. You identify and enter the coordinates of the point rounded to the nearest 0.5 unit.

a. To execute the program, select PRGM from the Main Menu and press [EXE]. Arrow to POINTS and press [EXE]. Press [EXE] again to start the program.

b. Study the screen and determine the coordinates of the marked point, then press [EXE].

c. Enter the *x*-coordinate and press [EXE]. You will see the graph screen again. Press [EXE], enter the *y*-coordinate and press [EXE].

d. If you enter the wrong coordinates, the calculator will ask you to try again. Look at the graph and repeat **steps b** and **c.**

e. If you enter the wrong coordinates a second time, the calculator will display the correct answer.

(continued)

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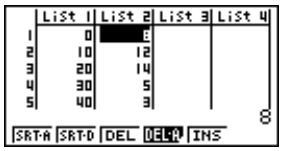
```
File Name:POINTS
0→N
"    POINTS"
"ALWAYS PRESS EXE"
"TO GO ON."◢
ClrText
"LOOK AT THE POINT ON"
"THE GRAPH."◢
ClrText
"DETERMINE ITS"
"COORDINATES."◢
Int (Ran#×1000)→S
Int (Ran#×1000)→T
If S÷2=Int (S÷2)
Then -1→S
Else 1→S
IfEnd
If T÷2=Int (T÷2)
Then -1→T
Else 1→T
IfEnd
{S×(Int ((Ran#×10+1)÷3)}→List 1
{T×(Int ((Ran#×10+1)÷4)}→List 2
Lbl 1
S-WindMan
ViewWindow -3.9,3.9,1,-2.3,2.3,1
S-Gph1 DrawOn,Scatter,List 1,
  List 2,1,Square
DrawStat
For -3→A To 3
For -2→B To 2
PlotOn A,B
Next
Next◢
ClrText
"(A,B) IS THE POINT."
"WHAT IS A"?→C
"WHAT IS B"?→D
If C=List 1[1]
Then If D=List 2[1]
Then "GOOD!"
Goto 2
IfEnd
IfEnd
If N=0
Then N+1→N
ClrText
"LOOK AGAIN"◢
Goto 1
Else ClrText
"NO. PRESS EXE TO SEE"
"THE ANSWER."◢
Plot List 1[1],List 2[1]
Lbl 2
```

Note 1G • Connecting the Points

The **xyLine** connects a sequence of points with line segments. The order in which the points are connected is the order in which the coordinates appear in the lists.

Entering the Data

Enter the *x*-coordinates (horizontal axis) into one list and the *y*-coordinates (vertical axis) into another list. **List 1** and **List 2** are used for this example, with {0, 10, 20, 30, 40, 50} entered into **List 1** and {8, 12, 14, 5, 3, 17} entered into **List 2**. (See **Note 1A** if you need help entering the data.) Note: The data can also be entered while in STAT mode. Any changes made to lists while in STAT mode show up in the same lists in LIST mode and vice versa.



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Setting the VIEW WINDOW Values

Select STAT from the Main Menu. While the data list is on display, press SHIFT [SET UP] F2 (Man) EXIT. Press SHIFT [V-Window] and input the following values on the View Window screen.

Xmin: −5 (This value is slightly less than the minimum of the *x*-coordinates.)

max: 55 (This value is slightly more than the maximum of the *x*-coordinates.)

scale: 5 (This number is the distance between tick marks. You can use 0, for no tick marks, or a value usually less than or equal to $\frac{\text{Xmax} - \text{Xmin}}{10}$.)

Ymin: −5 (This number is slightly less than the minimum of the *y*-coordinates. In this example, 0 would work, but a negative number allows you to see the *x*-axis.)

max: 20 (This value is slightly more than the maximum of the *y*-coordinates.)

scale: 5 (This number is the distance between tick marks. You can use 0, for no tick marks, or a value usually less than or equal to $\frac{\text{Ymax} - \text{Ymin}}{10}$. If your scale value is too small, the *y*-axis will appear too thick.)

The view window shown is [−5, 55, 5, −5, 20, 5].

Displaying the Connected Points

a. Press MENU to see the Main Menu. Highlight STAT and press EXE.

b. Press SHIFT [SET UP]. Arrow down to **Grid** and press F2 (**Off**). Press EXE.

c. Press F1 (GRPH) to display the graph menu.

d. Press F6 (SET) to enter the graph settings menu. Press a function key to select a graph.

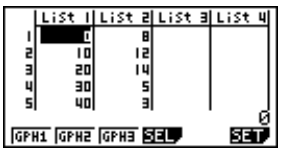
e. Arrow down to **Graph Type**. Press F2 (xy) to select **xyLine**.

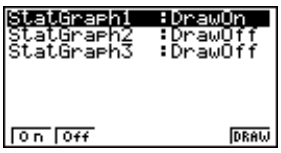
f. Arrow down to **XList** to display list choices. Press F1 to select **List 1**. Similarly, choose **List 2** for **YList**.

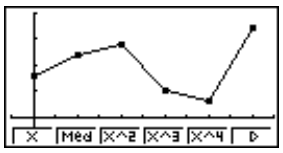
g. Arrow down to **Mark Type** and select a mark.

h. Arrow down to **Graph Color**. Press a function key to select the graph color.

i. Press EXIT to return to the graph menu. Press F4 (SEL). Use the down arrow and F1 or F2 to turn on the graph you selected and turn off the other graphs. Press F6 (DRAW) to draw the graph. (You can also graph from the Graph screen by pressing the function key corresponding to the number of the graph that you want to display.)







(continued)

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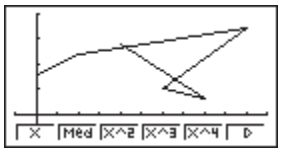
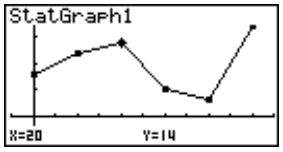


If the points are not listed in ascending order by their *x*-coordinates, your **xyLine** will be scrambled, with segments crisscrossing each other. While the data lists are on the screen, press F6 F1 (**SRT-A**) to sort in ascending order. The prompt **How many lists?** will appear to ask how many lists you want to sort. Press 2 EXE to indicate two lists. Respond to the next prompt by pressing 1 EXE to select **List 1** as the base list, and after the last prompt, press 2 EXE to select **List 2** as the second list. Notice that the sort command puts **List 1** in ascending order but maintains the original pairings between **List 1** and **List 2**. (See **Note 2B.**)

Tracing Connected Points

Press SHIFT [**Trace**]. Use the right and left arrows to move the cursor.



Errors

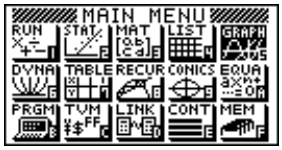
A **Dim ERROR** message means that the two lists do not have the same number of entries. The same error would appear if you accidentally turned on a graph you're not using or if you named the wrong list when you set up the graph. If anything appears on the graph other than the graph you set, press SHIFT [**Sketch**] F1 (**Cls**) to clear the extra graphs from the screen.

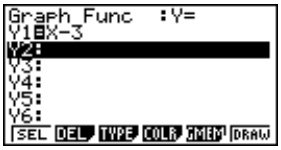
Note 1H • Equations

To graph an equation on your calculator, the equation must be in the form $y =$ "some expression." If the equation contains variables other than x and y, you need to rewrite it using only x and y as variables.

a. From the Main Menu, select **GRAPH**.

b. Enter the equation using the variable x. Press X,θ,T to enter the variable x. Press EXE.





c. Setting a window for graphing equations is not as easy as setting a window for data. If it is an application problem, think about what values make sense for both x and y. You may need to try different windows to find one that is appropriate. The following graph has a view window of $[-10, 10, 1, -10, 10, 1]$. Press EXIT to return to the Graph Func screen.

(continued)

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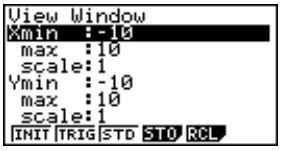
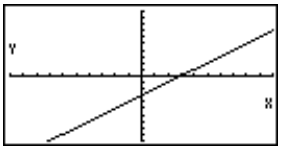
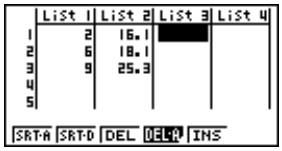
d. Press F6 (DRAW).

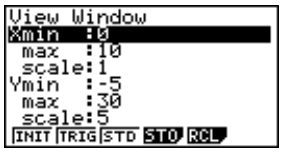




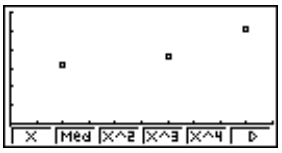
e. If you want the axes labeled, as in the previous screen, press SHIFT [SET UP], scroll down to **Label**, and press F1 (**On**). Press EXIT to return to the graph.

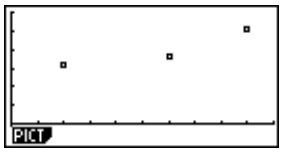
Tracing Equations and Plots on the Same Graph

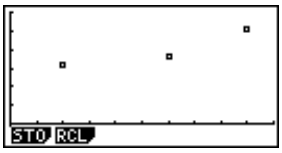


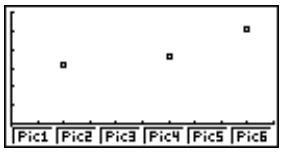


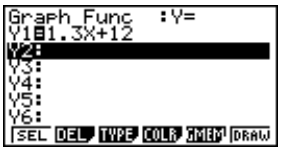
In STAT mode, enter the data and draw a scatter plot. Store the scatter plot in one of the six picture memories. To store in **Pic1**, press OPTN F1 (PICT) F1 (STO) F1 (**Pic1**). In GRAPH mode, enter the equation, set the view window, and graph the equation. Remember, your view window must accommodate both the data and the equation. Press OPTN F1 (PICT) F2 (RCL) F1 (**Pic1**) to recall a graph stored in **Pic1**. You will see the scatter plot and the equation(s) graphed on the same screen. To trace the equation, press SHIFT [**Trace**]. Note the label in the upper-left corner of the screen. When you are tracing an equation, the equation is displayed. To trace the scatter plot, store the equation graph in picture memory, graph the scatter plot, and recall the equation graph. Trace works on either the scatter plot or the equation, but not both at the same time. It works on whichever you graph first.

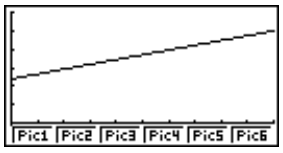


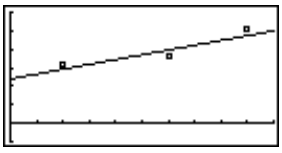


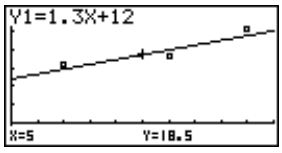












Errors

If you see a **Syn ERROR** message, check your equation and count the number of left and right parentheses to make sure they match. Look for numbers with two decimal points. Check that you used the negative or subtraction sign correctly. If you see the Graph screen but nothing appears, you might have a problem with your equation or your view window settings. Remember that your view window must accommodate both the equation and the scatter plot. Try changing one or both of these.

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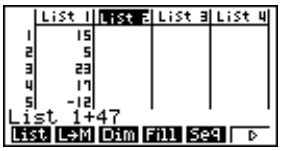
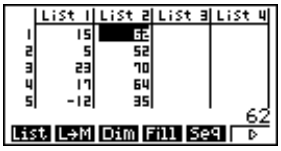
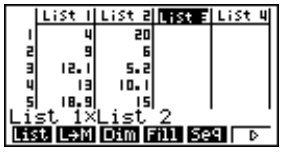
Note 1I • Formula-Generated Lists

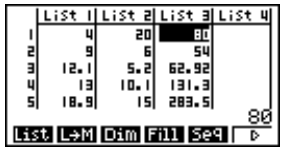
Enter the data into a list. (See **Note 1A.**) Move the cursor to another list, arrow up to highlight the list name, and press EXE. Enter the formula for the operations you wish to perform. For example, if List 2 is defined as List 1 plus 47, highlight List 2, press OPTN, then press F1 (LIST) F1 (List) 1 + 4 7 EXE. If you get an error message, press AC/ON. Make sure you have highlighted the name of the list before you enter the list operation. You can perform operations with list variables the same way you do with numbers. You can add, subtract, multiply, divide, or do any other mathematical operation.





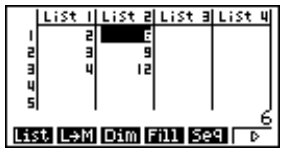
For another example, let List 1 be a list of rectangle lengths and let List 2 be a list of the corresponding widths. Move the cursor so that it highlights List 3 and enter the formula for the area of a rectangle, List 1 × List 2, by pressing OPTN F1 (LIST) F1 (List) 1 × F1 (List) 2. Press EXE.





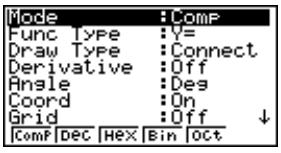
List Formulas

If you change the values in the list referred to in a formula, you must reenter the formula in order to update the values in the new list. For example, let List 1 be {2, 3, 4} and define the name of List 2 to be 3 × List 1. Now edit one of the entries in List 1; for example, change the 3 to 5. To change the second entry in List 2, you must reenter the formula for List 2.



Note 1J • Setting the Mode

Each mode on your calculator has different settings that you can change. While in RUN mode, press SHIFT [SET UP]. Arrow down to see more settings. The settings displayed in the screens above are the ones that you will use most often in this course while in RUN mode. Other modes may have different choices on their setup screens. If your calculator does not display these settings in RUN mode, follow the steps below to change them.



a. Use the arrow keys to highlight the setting you want.

b. Press a function key to register your selection. Sometimes pressing F6 (▷) gives more options.

c. When you have selected the settings you want, press EXIT to exit from the setup screen.

In this class you will need to change some of these settings during the year. The list may not mean much to you now, but your textbook will refer you back to this note several times during the course. All of these settings do not appear in all modes.

(continued)

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The following is a description of the mode settings that you may need (or want) to change. There are other settings in some modes that should not concern you in this course.

a. **Stat Wind** (statistics window) should be set to **Man** in this course.

b. **Graph Func** (graph function) gives you the choice to display or not display the function on the screen with its graph.

c. **Func Type** (function type) refers to the type of function (or relation) currently active on the calculator. **Y=** is the usual setting. The **Parm** (parametric) setting and inequality settings are also used. Press F6 (▷) to see the inequality options.

d. **Draw Type** refers to the way graphs are drawn. **Con** (connected) means that each calculated point will be connected to the next. **Plot** means that each calculated point is drawn by itself.

e. **Plot/Line** allows you to choose one of three colors for your graph.

f. **Dual Screen** allows you to split the screen to show two graphs or a graph and its table of values.

g. **Angle** allows you to choose the type of angle measure. In this course you will only use **deg** (degree) measure. This setting is not important until you reach the chapter on distance.

h. **Coord** (coordinates) allows you to show or not show the coordinates of points while tracing.

i. **Grid** allows you to show or not show the grid points on a graph screen.

j. **Axes** allows you to show or not show the axes on a graph screen.

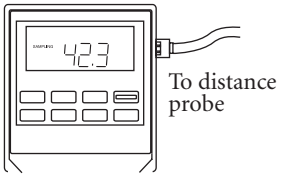
k. **Label** allows you to show or not show the label for the axes.

l. **Display** refers to the way in which numbers are written. The options are **Fix** (fixed), **Sci** (scientific), **Norm** (normal) and **Eng** (English). Usually the setting should be **Norm**. **Sci** is used in the chapter on exponents. After you choose **Sci**, you also decide on the total number of digits you want displayed. The **Fix** setting is useful in hiding long decimal answers and will make some numbers clearer. After choosing **Fix**, you choose how many digits appear to the right of the decimal point. This setting is helpful in applications involving money, for example, where one wants two decimal places showing. Change this setting back to **Norm** when you don't need a special display.

If you find that your screen looks strange when you try to do something, it's a good idea to look at the setup screen and check to see if any settings have been changed.

Note 1K • EA-100 Reading a Distance

To read a distance, you will need a Casio EA-100 Data Analyzer, an Ultrasonic Motion Sensor (distance probe), and a meterstick or meter tape. Your EA-100 does not need to be connected to a calculator to measure distance.



(continued)

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a. Connect your EA-100 to a distance probe from the sonic port on the right side of the EA-100.

b. Turn on the EA-100.

c. Press MODE until the EA-100 begins flashing SAMPLING and DONE alternately. Your EA-100 is now ready to measure and display in the multimeter mode.

d. Push the CH-View button several times until the EA-100 display indicates SONIC M.

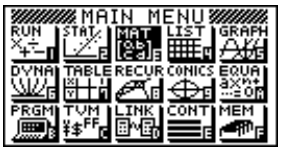
You should see the distance probe's blinking red light and hear it clicking as it samples measurements (in meters) to the nearest object in front of it. As you point the distance probe at various objects, your EA-100 will display the distances to the nearest object in meters. Shown on the previous page is a reading of an object that is 3.14 meters from the probe.

e. Use your meterstick (tape) and hold the distance probe so the front of the probe is exactly 1 meter from the wall, then take a reading. Determine whether the distance is measured to the front, middle, or back of the probe. This knowledge is important for accurate length measurements. You will need to repeat this step if you change equipment because not all devices work the same.

Errors

If you do not get a reading, check to make sure the distance probe is plugged into the port marked SONIC and that the link cable is securely connected.

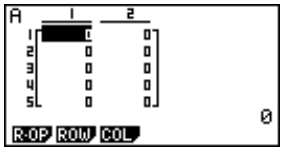
Note 1L • Matrices



To enter MATRIX mode, arrow to MAT on the Main Menu and press EXE. The MATRIX mode allows you to work with up to 26 matrices: Mat A, Mat B, . . . , Mat Z. To define and store a matrix, Mat A, for example, highlight Mat A on the Matrix screen. If a matrix is not defined, :None shows to the right of its name. The dimensions of a matrix are given as rows by columns. Enter the first dimension, the number of rows, and press EXE. Then enter the second dimension, the number of columns, and press EXE. Notice that after you enter both dimensions, the matrix on the screen will be set at the appropriate size. On this calculator, matrix dimensions are limited to 255 rows or 255 columns.

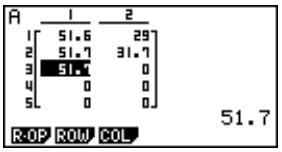
Entering a Matrix

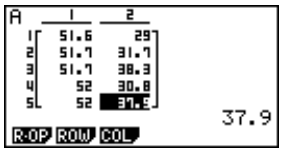
After entering the dimensions, the cursor will be at row 1, column 1. Enter the value and press EXE. The cursor moves across the first row, then down to the next row. Continue to enter values and to press EXE after each entry. You can edit any entry by arrowing to the position and reentering the value.

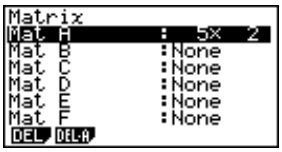


(continued)

After you have entered all of the values, press EXIT to store the matrix and to return to the Matrix screen. Notice that the dimensions are listed beside Mat A. Any matrix that shows dimensions on the Matrix screen is defined.



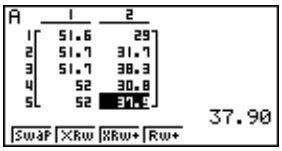




Displaying a Matrix

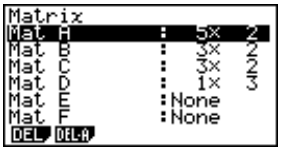
To display Matrix A, choose Mat A on the Matrix screen and press EXE. The letter "A" appears in the upper-left corner of the screen and the complete matrix is displayed. To return to the Matrix screen, press EXIT.

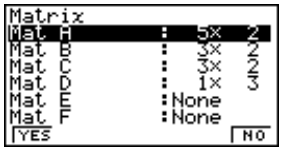
If you want a matrix to represent money, you can set the calculator so that all numbers are rounded to two decimal places. To change the setting, press SHIFT [SET UP] and highlight Display. Press F1 (Fix) and F3 to select two decimal places. Press EXIT to return to the Matrix screen. As you use the arrow keys to move around the matrix, the highlighted values will be displayed to two decimal places at the bottom-right corner of the screen.



Changing or Deleting a Matrix from the Calculator

You can always change a matrix entry by arrowing to the matrix name on the Matrix screen and pressing EXE, then arrowing to the entry you want to change. If you reenter the dimensions, you will define a new matrix replacing the one you had. You might, however, want to conserve memory space and delete a matrix (or all matrices) from your calculator. To delete a matrix, go to the Matrix screen and press F1 (DEL) F1 (YES). To delete all matrices, press F2 (DEL-A) F1 (YES).





Errors

If you get a MEM ERROR message, it means there is not enough free memory to create a matrix of the size that you chose.

A Dim ERROR message probably indicates that you have named a matrix that is not defined.

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Note 1M • Adding or Subtracting Matrices

To add or subtract two matrices, the matrices must have the same dimensions.

Define Mat B to have dimensions 3 × 2, and enter the values below. (See **Note 1L.**)

1, 1 = 8.9 1, 2 = 9.1

2, 1 = 2.35 2, 2 = 2.65

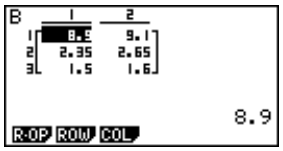
3, 1 = 1.5 3, 2 = 1.6

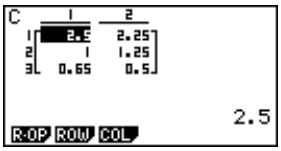
Define Mat C to have dimensions 3 × 2, and enter the values below.

1, 1 = 2.5 1, 2 = 2.25

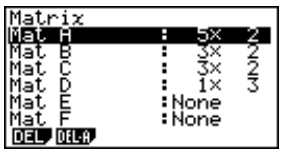
2, 1 = 1 2, 2 = 1.25

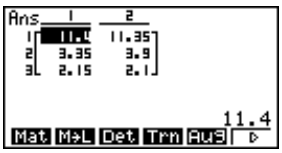
3, 1 = .65 3, 2 = .5

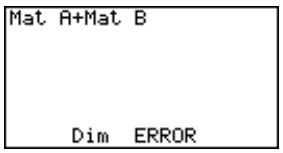




Go to the Run screen from the Main Menu.
Press OPTN F2 (MAT) F1 (Mat) ALPHA [B] + F1 (Mat) ALPHA [C] EXE. The matrix showing on the screen is the sum of Matrix B and Matrix C.





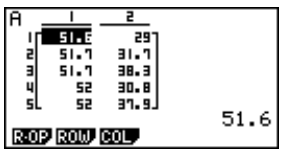


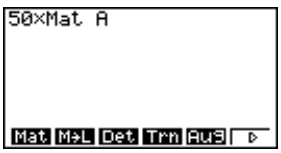
Errors

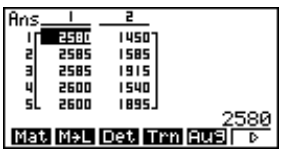
If you get a Dim ERROR message, you've tried to add (or subtract) two matrices that don't have the same dimensions or you have named a matrix that is not defined.

Note 1N • Multiplying a Matrix by a Number

To multiply a matrix by a number, multiply each cell value of the matrix by the number. For example, to multiply Mat A (from **Note 1L**) by 50, select RUN from the Main Menu. Then press 5 0 × OPTN F2 (MAT) F1 (Mat) ALPHA [A] EXE. The matrix answer appears on the screen.







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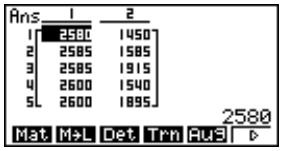
Multiplying a number by a matrix, Mat A × 50, for example, is done in the same way. Press OPTN F2 (MAT) F1 (Mat) ALPHA [A] × 5 0 EXE.



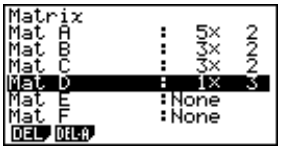
Errors

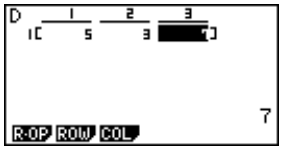
A Dim ERROR message probably indicates that you have named a matrix that is not defined.

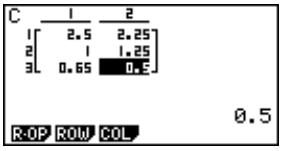
Note 1P • Multiplying Two Matrices

To multiply two matrices, the number of columns in the first matrix must match the number of rows in the second. For example, if the first matrix has dimensions 1 × 3 and the second matrix has dimensions 3 × 2, the three columns of the first matrix will match the three rows of the second. The multiplication will be defined.

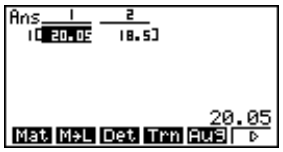
Enter Mat D and Mat C as shown in the screens below. (See **Note 1L.**)







Display Mat D × Mat C on the Run screen using the following keystrokes: OPTN F2 (MAT) F1 (Mat) ALPHA [D] × F1 (Mat) ALPHA [C]. Press EXE and the product will appear on the screen. The dimensions of the product are (*the number of rows of the first matrix*) × (*the number of columns of the second matrix*). In this example, a 1 × 3 matrix times a 3 × 2 matrix has a 1 × 2 answer.



Errors

If you get an ERR:DIM MISMATCH message, then the number of columns in the first matrix does not match the number of rows in the second.

An ERR:UNDEFINED message probably indicates that you have named a matrix that is not defined.

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